Gastric ESD

Current Status and Future Directions of Devices and Training

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KEYWORDS

• Endoscopic submucosal dissection • Early gastric cancer • Lymph node metastasis • Pathologic staging • Endoscopic mucosal resection

KEY POINTS

- ESD designed to provide precise pathologic staging and curability based on en bloc R0 specimen irrespective of the size and/or location of the tumor.
- ESD requires high technical skills on the part of the operator, is time consuming, and is associated with procedural related complications.
- Standardized ESD training system is urgently needed to disseminate safe and effective ESD technique to practices with limited ESD experience.

Videos of endoscopic submucosal dissection procedures on the stomach accompany this article

PRINCIPLE OF ENDOSCOPIC RESECTION AS A DEFINITIVE TREATMENT

Early gastric cancer (EGC) is defined when the cancer invasion is confined to the mucosa or submucosa (T1 cancer), irrespective of the presence of lymph node

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metastasis.[1] The presence of lymph node metastasis is a strong predictor on patients' prognosis,[2,3] and for this reason gastrectomy with lymph node dissection has historically been the gold standard for treatment of EGC.[4]

The 5-year cancer-specific survival rates of EGC limited to the mucosa or the superficial submucosa were reported to be 99% and 96%, respectively.[5] However, the traditional approach of radical gastric surgery is associated with significant morbidity and reductions in quality of life.[6] Surgery to remove intramucosal gastric cancer whereby the incidence of lymph node metastasis is low (up to 3%) is therefore excessive for most patients. By comparison, surgery in the majority is appropriate when the cancer involves the deep submucosa, where the incidence of lymph node metastasis increases to as high as 20%.[7] A stratification method to identify patients who have negligible risk for developing lymph node metastasis would thus optimize the selection of patients who can be cured by endoscopic resection and thus avoid the risks of surgery. The ideal patients for endoscopic resection rather than surgery are those who have a lower mortality risk from metastasis.[8]

Precise stratification of patients with favorable prognosis should be underscored. Endoscopic ultrasonography has limited staging accuracy (80%–90%),[9] and thus would result in unnecessary surgery in up to 20% of patients.[10–12] Ablation endoscopic techniques may cure EGC, but do not provide a pathologic specimen for analysis,[13] leaving the patient without proper staging or prognosis. Prior experience in the 1980s and 1990s suggests that pathologic staging is the best predictor of the risk for lymph node metastasis.[14,15]

The most accurate method to stratify the patients' prognosis for developing lymph node metastasis was reported by Gotoda and colleagues in 2000. In a study involving 5265 patients who had undergone gastrectomy with careful lymph node dissection and pathologic analysis, the risks of lymph node metastasis can be clustered to several pathologic findings of the involved mucosa and submucosa: macroscopic appearance, size, depth, differentiation of cancer, and lymphatic and vascular involvement. This seminal work provides one of the pillars of endoscopic resection of EGC.

The Paris classification of superficial neoplasias of the gastrointestinal tract provides another pillar. It allows standardization of the endoscopic appearance of EGC, which is then useful to estimate tumor depth and likelihood of the risk of lymph node metastasis.[16] The en bloc resected specimen provides further information on size, depth, and differentiation of cancer, as well as lymphatic and vascular involvement. Thus the tumor can be accurately staged, the patient's prognosis estimated, and the need for additional therapy assessed.[17,18]

The major advantage of endoscopic resection is the ability to provide accurate pathologic staging without precluding future surgical therapy.[19,20] After endoscopic resection, pathologic assessment of depth of cancer invasion, degree of cancer differentiation, and involvement of lymphatics or vessels allows the prediction of the risk of lymph node metastasis.[21] The endoscopic submucosal dissection (ESD) technique was developed to extend the ability of endoscopic mucosal resection (EMR) to remove lesions larger than 2 cm en bloc,[22,23] as EMR is limited to the resection of small tumors. It is also known that piecemeal resections of lesions larger than 2 cm lead to a high risk for recurrence of local cancer and inadequate pathologic staging.[24,25] ESD allows for large en bloc resection regardless of tumor size, location, and/or submucosal fibrosis, thereby allowing precise pathologic staging.[26–29] ESD is the most gratifying for patients with EGC because of its minimally invasive and curative potential, which is why it is increasingly used globally.[30–34]